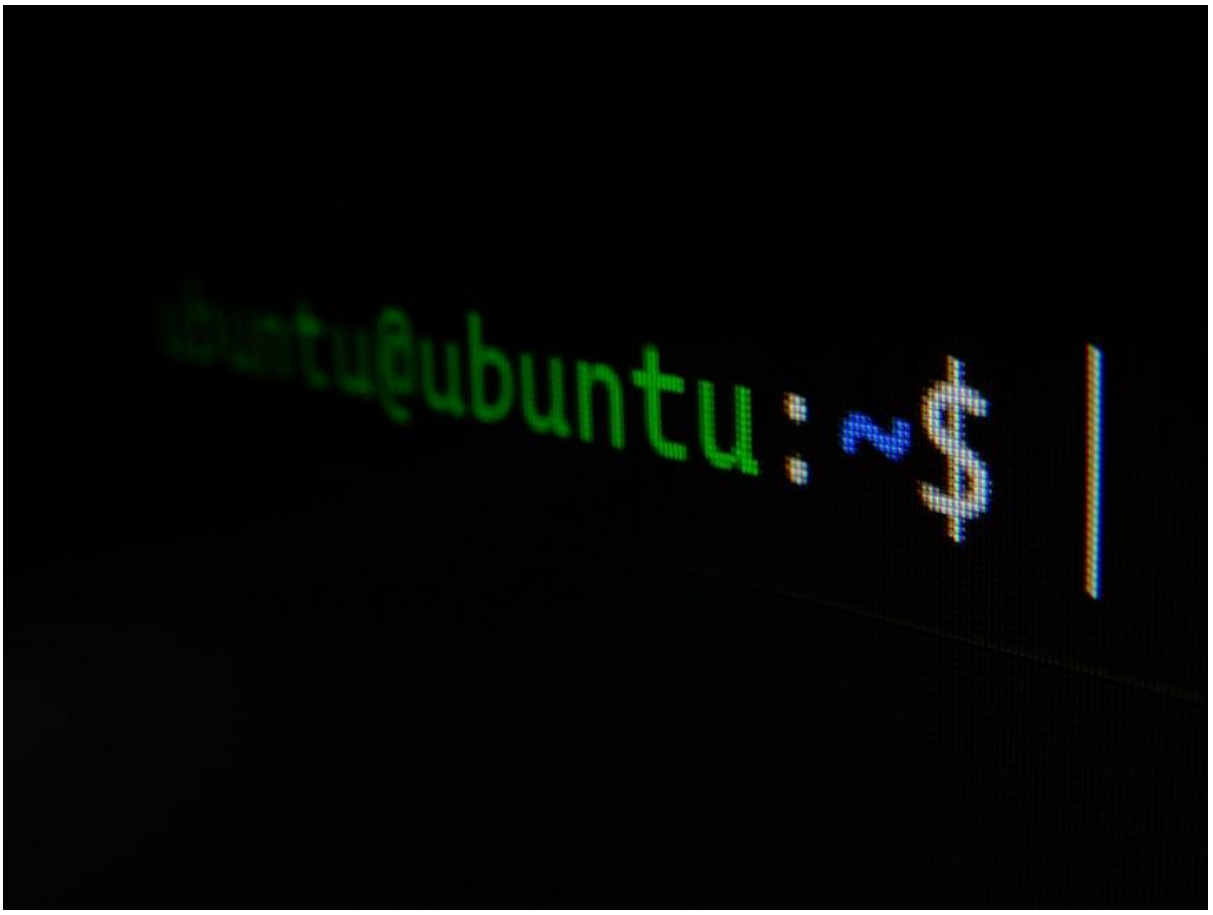
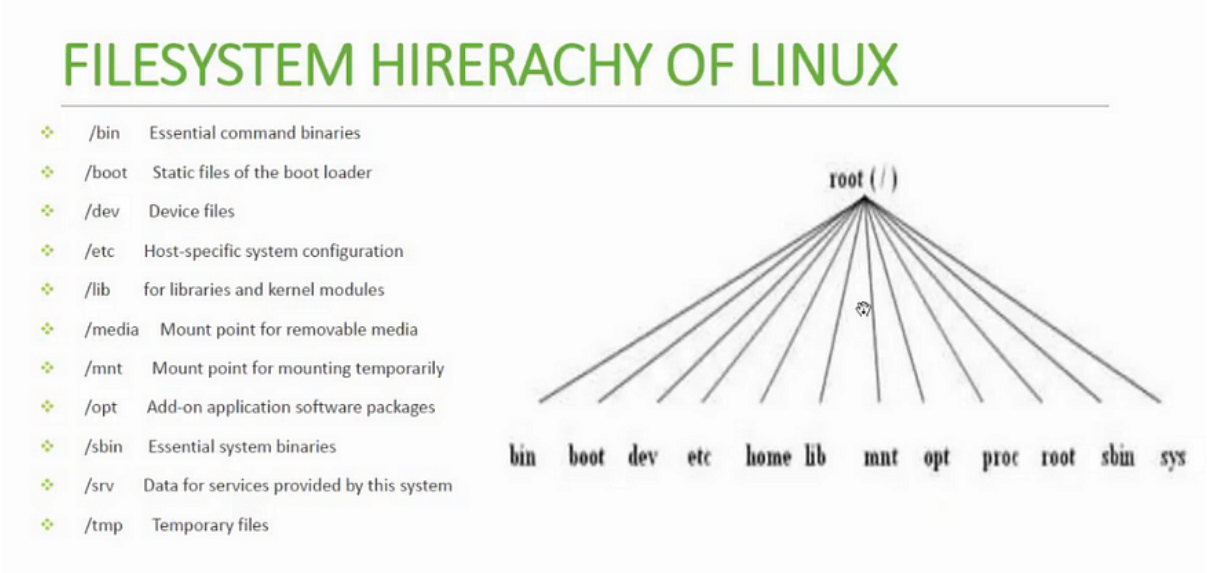


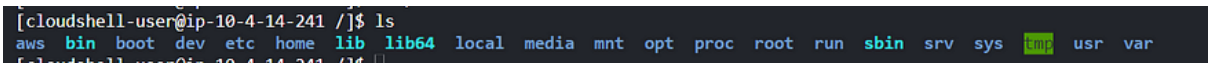
Photo by Gabriel Heinzer on Unsplash

Linux File System Hirerachy



1. /

The base of Linux Directory is the root. Every directory arises from root user. It is presented by forward slash(/)

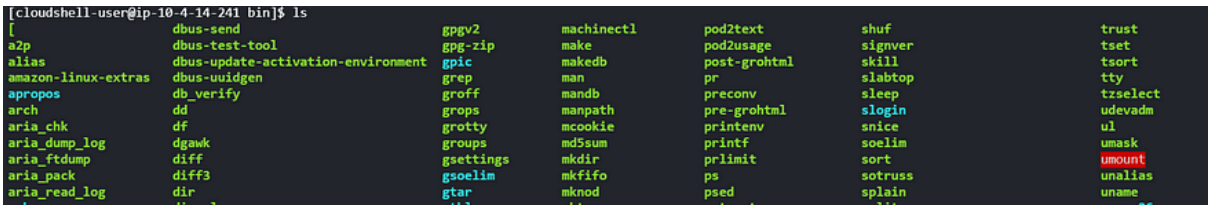


2. /root

This is the home directory for root user

3. /bin

This contains binary executables. Common linux commands are stored in this folder

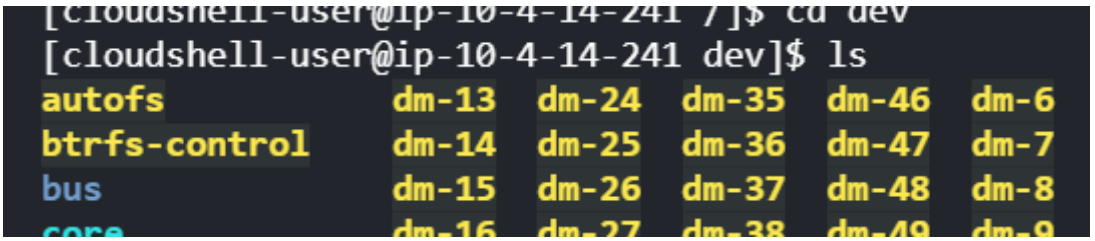


4. /sbin

This contains system binaries. The commands stored in this folder is used by System administrator for maintenance purpose.

5. /dev

This folder contains hardware Device files. It stores the information of usb, device attached to the system.



6. /var

This contains variable files. It stores files which tend to grow such as log files.

/var/log = System log files generated by OS

/var/lib = contains database and package files

/var/mail = contains emails

/var/tmp = temporary files

7. /mnt

This directory is used to mount a file system temporarily

8. /media

Removable media devices

9. /usr

User binaries. Contains files and applications used by users.

```
[cloudshell-user@ip-10-4-14-241 usr]$ ls
bin  etc  games  include  lib  lib64  libexec  local  sbin  share  src  tmp
```

10. /etc

Configuration files. It contains configuration files of servers.

```
[cloudshell-user@ip-10-4-14-241 /]$ cd etc
[cloudshell-user@ip-10-4-14-241 etc]$ ls
adjtime            depmod.d                groff       init.d       logrotate.d       openldap       profile.d    rpc
aliases            DIR_COLORS              group       inputrc      machine-id        opt            protocols    rpm
alternatives       DIR_COLORS.256color     group-      issue        man_db.conf       os-release     python       rsyslog.d
bash_completion.d  DIR_COLORS.lightbgcolor gshadow     issue.net    modprobe.d        pam.d          rc0.d        sasl2
bashrc             dracut.conf.d           gshadow-    krb5.conf    modules-load.d    passwd         rc1.d        securetty
binfmt.d           environment             gss         krb5.conf.d  motd              passwd-        rc2.d        security
chkconfig.d        ethertypes              host.conf   ld.so.cache  mtab              pkcs11         rc3.d        selinux
```

11. /boot

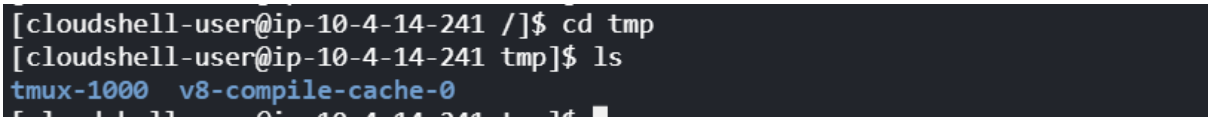
This directory contains files needed to boot the system

12. /home

Home directory, this contains secondary users home directory

13. /tmp

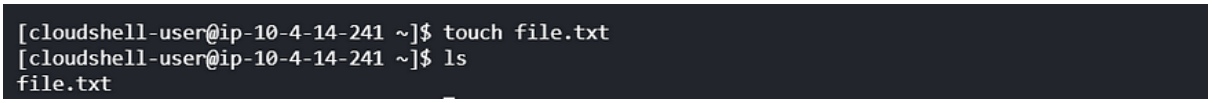
It contains temporary files created by System and users.



We will practice various commands:

1. touch: Touch to create a new file

<touch file.txt>



2. create multiple files

touch python java reactjs

```
[cloudshell-user@ip-10-4-14-241 ~]$ touch python java reactjs
[cloudshell-user@ip-10-4-14-241 ~]$ ls
file.txt  java  python  reactjs
```

3. create number of files

touch file{1..5}

```
[cloudshell-user@ip-10-4-14-241 ~]$ touch file{1..5}
[cloudshell-user@ip-10-4-14-241 ~]$ ls
file1  file2  file3  file4  file5  file.txt  java  python  reactjs
```

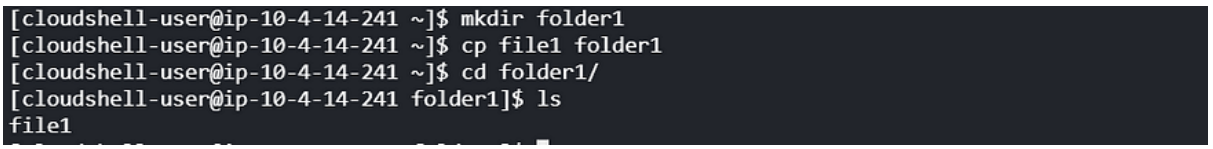
4. For copy and paste

cp : to copy and paste

syntax: cp <option><source><destination>

- -r for recursive
- -v for verbose
- -f for forcefully

cp file1 folder1



5. To remove file and directory

rm -rvf /maharastra/mumbai

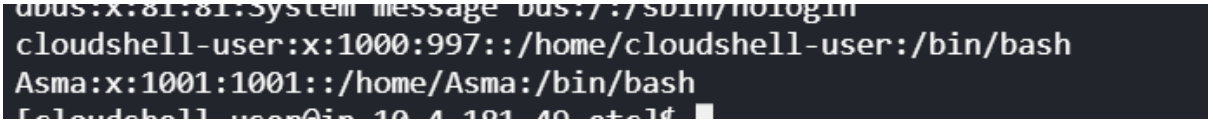
6. To move file or rename a file or directory

mv test testers

User Management

1. Create user account

useradd Asma



2. For switching user account

su Asma

3. For deleting user account

userdel Asma

Group Management

A group is a collection of user account.

1. To add group

groupadd Developers

2. To add single member in the group

gpasswd -a Asma Developers

```
[cloudshell-user@ip-10-4-181-49 etc]$ sudo gpasswd -a Asma Developers
Adding user Asma to group Developers
```

3. For adding multiple members in a group

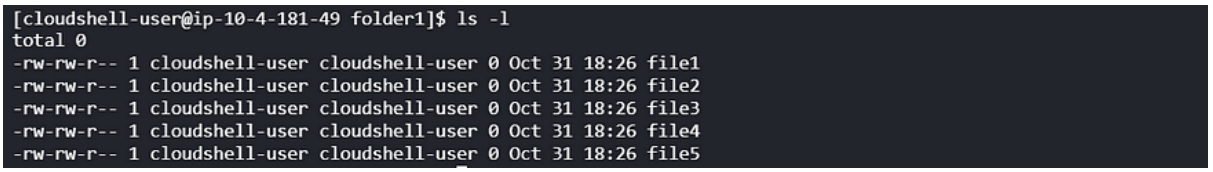
sudo gpasswd -M John,Martha,Simba Developers

Linux File System Permission

There are three kinds of permission

1. Basic permission
2. Special permission
3. Access control list permission (ACL)

ls -l



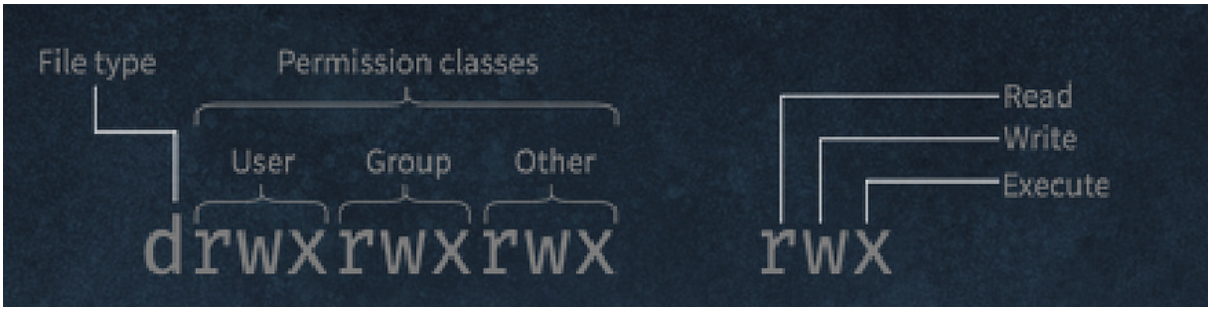
rw-rw-r — 1 cloudshell-user cloudshell-user 0 Oct 31 18:26 file1

- permission
- link
- owner
- group owner
- size of file
- date and time of file creation
- name of file

Permission group

Permission description

- Owner(u) — Permissions of Owner
- Group(g) — Permissions for the members of Group
- Other(o) — Permission used by all Other users



Set permissions with numeric value

read(r) = 4

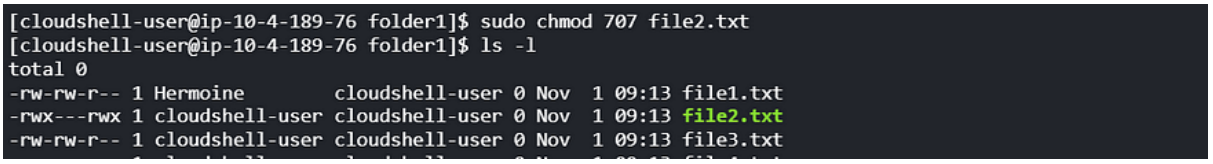
write(w) = 2

execute(x) = 1

Read(4)	Write(2)	Execute(1)	Number
R	W	X	7
R	W	-	6
R	-	X	5
R	-	-	4
-	W	X	3
-	W	-	2
-	-	X	1
-	-	-	0

For giving read write execute permission to owner and others for file2.txt

sudo chmod 707 file2.txt



For changing owner of file:

sudo chown Hermoine file1.txt

```
[cloudshell-user@ip-10-4-189-76 folder1]$ sudo chown Hermoine file1.txt
[cloudshell-user@ip-10-4-189-76 folder1]$ ls -l
total 0
-rw-rw-r-- 1 Hermoine        cloudshell-user 0 Nov  1 09:13 file1.txt
-rw-rw-r-- 1 cloudshell-user cloudshell-user 0 Nov  1 09:13 file2.txt
-rw-rw-r-- 1 cloudshell-user cloudshell-user 0 Nov  1 09:13 file3.txt
-rw-rw-r-- 1 cloudshell-user cloudshell-user 0 Nov  1 09:13 file4.txt
-rw-rw-r-- 1 cloudshell-user cloudshell-user 0 Nov  1 09:13 file5.txt
[cloudshell-user@ip-10-4-189-76 folder1]$
```

Access Control List:

It provides more flexible mechanism for file systems.

It is used for providing special permissions to users or groups.

To check ACL permission

getfacl folder1

```
[cloudshell-user@ip-10-4-189-76 folder1]$ cd ..
[cloudshell-user@ip-10-4-189-76 ~]$ sudo getfacl folder1
# file: folder1
# owner: cloudshell-user
# group: cloudshell-user
user::rwx
group::rwx
other::r-x
```

To set ACL permission to user

setfacl -s user:billy:r-x fil2.txt

Regular Expression:

Regular expressions are special characters which help searches data and match complex patterns

grep:

(Global Regular Expression Print)- The grep filter searches a file for particular pattern of characters and display all lines that matches the pattern.

grep -i delhi file1.txt

```
[cloudshell-user@ip-10-4-189-76 ~]$ vi file1.txt
[cloudshell-user@ip-10-4-189-76 ~]$ grep -i delhi file1.txt
Delhi
Delhi
Delhi
```

To search a string in a file

grep root /etc/passwd

```
[cloudshell-user@ip-10-4-189-76 ~]$ grep root /etc/passwd
root:x:0:0:root:/root:/bin/bash
operator:x:11:0:operator:/root:/sbin/nologin
```

To search a string in multiple files

grep root /etc/passwd /etc/group

```
[cloudshell-user@ip-10-4-189-76 ~]$ grep root /etc/passwd /etc/group
/etc/passwd:root:x:0:0:root:/root:/bin/bash
/etc/passwd:operator:x:11:0:operator:/root:/sbin/nologin
/etc/group:root:x:0:
[cloudshell-user@ip-10-4-189-76 ~]$
```

To search a string in all files recursively

grep -v /etc/root

Find command:

It is one of the most important and used command in Linux. It is used to locate the list of files and directories based on the condition

To find files under home directory

find /home -name file2.txt

```
[cloudshell-user@ip-10-4-189-76 ~]$ sudo find /home -name file2.txt
/home/cloudshell-user/folder1/file2.txt
[cloudshell-user@ip-10-4-189-76 ~]$
```

WC(Word Count):

wc command is use to count the number of words and line numbers

wc -l /etc/passwd

```
[cloudshell-user@ip-10-4-189-76 ~]$ wc -l /etc/passwd
18 /etc/passwd
[cloudshell-user@ip-10-4-189-76 ~]$
```

Head:

It is used to find the top lines in a file

head /etc/passwd

```
[cloudshell-user@ip-10-4-189-76 ~]$ head /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin
operator:x:11:0:operator:/root:/sbin/nologin
[cloudshell-user@ip-10-4-189-76 ~]$
```

head -n 15 /etc/passwd

```
operator:x:11:0:operator:/root:/sbin/nologin
[cloudshell-user@ip-10-4-189-76 ~]$ head -n 15 /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin
operator:x:11:0:operator:/root:/sbin/nologin
games:x:12:100:games:/usr/games:/sbin/nologin
ftp:x:14:50:FTP User:/var/ftp:/sbin/nologin
nobody:x:99:99:Nobody:/:/sbin/nologin
systemd-network:x:192:192:systemd Network Management:/:/sbin/nologin
```

Tail is used to find the last lines in a file.

tail -n /etc/passwd

```
[cloudshell-user@ip-10-4-189-76 ~]$ tail -n 5 /etc/passwd
systemd-network:x:192:192:systemd Network Management:/:/sbin/nologin
dbus:x:81:81:System message bus:/:/sbin/nologin
cloudshell-user:x:1000:997::/home/cloudshell-user:/bin/bash
HarryPotter:x:1001:1001::/home/HarryPotter:/bin/bash
Hermoine:x:1002:1002::/home/Hermoine:/bin/bash
```

Archiving Files in Linux:

Archiving is the process of combining multiple directories and files in a single file. It can be used as a form of backup.

Tar:

tar is stands for tape archive. It is used by system administrators

options for tar:

- -c for create
- -x for extract
- -v for verbose
- -f for forcefully
- -t for test
- -z for gzip

tar <options><files>

tar -cvzf /mnt/backup.tar /var

```
[cloudshell-user@ip-10-2-101-234 mnt]$ ls
backup.tar
```

to show file size in human readable format

du -sh /mnt/backup.tar

```
[cloudshell-user@ip-10-2-101-234 ~]$ du -sh /mnt/backup.tar
338M    /mnt/backup.tar
```

To extract a tar archive file in default location

tar -xvf /mnt/backup.tar

To create a tar archive file with compress in size(gzip)

tar -cvf archive.tar.gz file1.txt file2.txt folder1

```
[cloudshell-user@ip-10-2-101-234 ~]$ mkdir folder1 folder2
[cloudshell-user@ip-10-2-101-234 ~]$ touch file{1..5}.txt
[cloudshell-user@ip-10-2-101-234 ~]$ tar -cvf archive.tar.gz file1 file2 directory
tar: file1: Cannot stat: No such file or directory
tar: file2: Cannot stat: No such file or directory
tar: directory: Cannot stat: No such file or directory
tar: Exiting with failure status due to previous errors
[cloudshell-user@ip-10-2-101-234 ~]$ tar -cvf archive.tar.gz file1.txt file2.txt folder1
file1.txt
file2.txt
folder1/
```

To extract a tar archive file with compress in size gzip

Job Automation:

Job automation in Linux refers to the process of automating repetitive tasks or jobs by creating scripts or using tools that can perform these tasks automatically without the need for manual intervention.

1. at command is used to execute one job at a time
2. crontab is used to execute a job multiple times

Managing networking :

To show IP address : **ipconfig** or **ip addr**